Reusable Communication Infrastructure for Small Satellites

Completed Technology Project (2013 - 2016)

Project Introduction

The research goal of this project is to develop a comprehensive communications reference architecture that is applicable to a wide variety of small satellite missions. The motivation for creating this reference architecture is to aid small satellite development teams who don't have the resources to develop a communication system from the scratch. The product of this research will primarily take the form of an online living document that will serve as a design reference and collaboration tool for small satellite developers. To develop the reference architecture, existing communication solutions will be surveyed including spacecraft hardware (i.e. radio modems and antennas), ground stations, and protocols. Particular emphasis will be placed on understanding the interoperability and compatibilities between these solutions. Once existing solutions are well understood, recommended configurations covering the end-to-end communication system will be specified. These solutions will be evaluated against a set of mission profiles that represent the diverse cross section of mission demands found in the small satellite field. In cases where existing solutions are deficient, the applicant will apply his industry experience with SATCOM systems to address these needs. Later work will consider how advanced technologies, such as optical communications and SDR, can be used to augment the capabilities of the reference architecture. The proposed work directly addresses the Integrated Radio Systems need (TABS Element 5.5.1) that is listed as a high-priority item on the NASA Technology Roadmap.

Anticipated Benefits

The research goal of this project is to develop a comprehensive communications reference architecture that is applicable to a wide variety of small satellite missions. The motivation for creating this reference architecture is to aid small satellite development teams who don't have the resources to develop a communication system from the scratch.

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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Space Technology Research Grants

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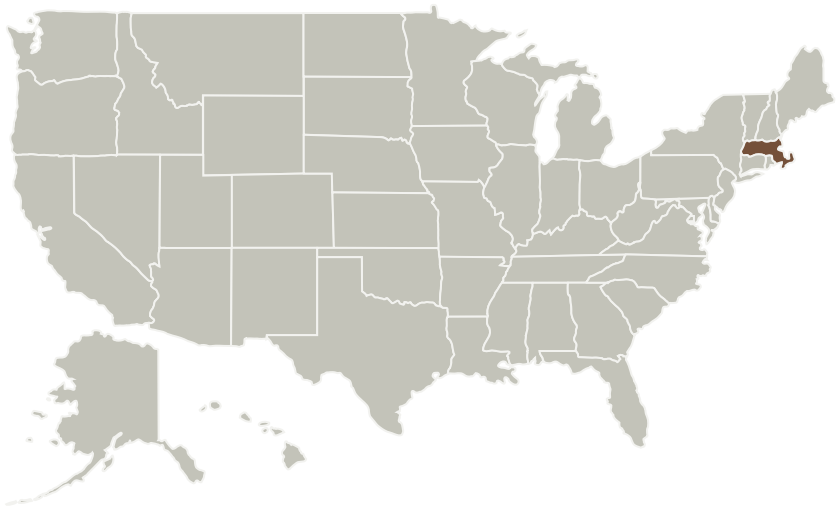
Primary U.S. Work Locations and Key Partners



Primary U.S. Work Locations
Massachusetts

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Project Management

Program Director:
Claudia M Meyer

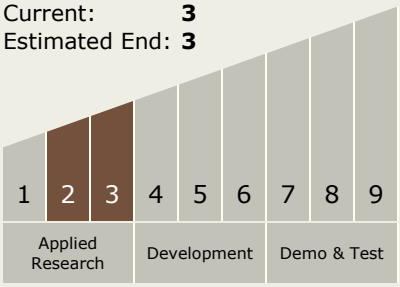
Program Manager:
Hung D Nguyen

Principal Investigator:
Kerri Cahoy

Co-Investigator:
Ryan W Kingsbury

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.3 Internetworking
    - TX05.3.1 Disruption Tolerant Networking